

BIOMARKERS IN VETERINARY AND ANIMAL SCIENCE

ANNA MARIA BASSOLS TEIXIDÓ

PROFILE



PhD in Pharmacy from the University of Barcelona (UB). Postdoctoral fellow at the Department of Biochemistry at Massachusetts University Medical Center (USA, 1986-1987).

In 1988 I joined the Universitat Autònoma de Barcelona (UAB), where I am Full Professor (2009) at the Departament de Bioquímica i Biologia Molecular at the Facultat de Veterinària. After working for many years in extracellular matrix, cell differentiation and cancer, in 2005 I decided to make a complete turn and start a new line of research on the applications of biochemistry and biochemical techniques to veterinary problems, in particular the search for biomarkers for stress, pathology, nutrition and development. We are especially interested in the application of proteomics and metabolomics to veterinary medicine, mostly in farm but also small and exotic animals. Acute phase proteins are an area of special interest.

We are also interested in applied aspects and we actively participate in joint projects with companies for the design of reagents for veterinary clinical chemistry.

Currently, the specific lines of research and the main techniques used are:

The main topic of our research group are:

- Biomarkers for animal science and veterinary medicine.
- Enzymatic and immunological assays.
- Proteomics and metabolomics for biomarker search

I am also the Scientific Director of the Service of Veterinary Clinical Biochemistry at UAB
Author of 104 research articles in peer-reviewed journals. IP or participant in 16 research projects. Supervisor (director) of 17 PhD Thesis and 25 Master Thesis

RESEARCH

RESEARCH INTERESTS

The problems of the most important species from the productive, food and economic point of view (pig, cattle) from different approaches:

- Use of proteomic techniques to study these processes and identify biomarkers.
- Study of acute phase proteins: structure, function and utility as biomarkers.
- Role of brain neurotransmission in swine and cattle under stress and the influence of nutrition.

We are not fully aware of this, but the health and productive problems of farm animals are an essential aspect of the basic sciences. Diseases that can happen to humans, diseases that reduce the growth rate of animals, problems associated with animal welfare and stress ...

Proteomics offers fantastic tools to address these problems: our group has mainly studied aspects related to stress and nutrition of farm animals, especially for their economic consequences.

Quantitative and functional proteomics techniques can be applied to these problems.

We also study the acute phase response, especially the production and functions of acute phase proteins in income animals. These proteins are markers of inflammation, but also of productivity, stress and food safety.

We are also interested in the role of brain neurotransmitters in controlling behavior in pigs, especially with respect to animal welfare.

The group maintains important relations with the Veterinary Clinical Biochemistry Service (s.bioquimica.clinica@uab.cat)

We have taken collaborative projects with the reagent industry for the development and validation of reagents, mostly for acute phase proteins

MAIN RESEARCH LINES AND STRATEGIC OBJECTIVES

The main lines of our research group are:

- Biomarkers for animal science and veterinary medicine.
- Enzymatic and immunological assays.
- Proteomics and metabolomics for biomarker search

We achieve these goals in collaboration with leading research institutes on animal science (IRTA, INIA, Instituto Superior de Agronomia de Lisboa,).

LAB FEATURED PUBLICATIONS:

Factors Influencing Biomarker Range Intervals in Farm Animals (Editorial). Ana María Gutiérrez, Anna Bassols, Laura Soler, Matilde Piñeiro. *Frontiers in Veterinary Science*, section Veterinary Experimental and Diagnostic Pathology (2020) 7:587741. doi: 10.3389/fvets.2020.587741.

Environmental enrichment alters monoaminergic neurotransmitters and the hippocampal proteome in pigs. Laura Arroyo; Daniel Valent; Ricard Carreras; Raquel Pato; Josefa Sabrià; Antonio Velarde; Anna Bassols. *Journal of Proteomics* 2020 Vol 229, Oct 30, 103943. <https://doi.org/10.1016/j.jprot.2020.103943>

Metabolome and Proteome Changes in Skeletal Muscle and Blood of Preruminant Calves with Leucine and Threonine Supplemented Diets. Kuai Yu, Manolis Matzapetakis, Anita Horvatić, Marta Terré, Alex Bach, Josipa Kuleš, Natalia Yeste, Néstor Gómez, Laura Arroyo, Elisabet Rodríguez-Tomás, Raquel Peña, Nicolas Guillemin, André M. De Almeida, Peter David Eckersall, Anna Bassols. *Journal of Proteomics* 2020 Feb 3:103677. doi: 10.1016/j.jprot.2020.103677.

Effects of a high fat diet on appetite regulatory neuropeptides and neurotransmitters and the counteracting action of adding probiotics and omega-3 fatty acids in a pig model. Daniel Valent, Laura Arroyo, Emma Fàbrega, Maria Font-i-Furnols, María Rodríguez-Palmero, Jose Antonio Moreno-Muñoz, Joan Tibau, Anna Bassols. *Beneficial Microbes* (2020) 11, 347-359 DOI 10.3920/BM2019.0197

SWATH-MS quantitative proteomic investigation of intrauterine growth restriction in a porcine model reveals sex differences in hippocampus development. Daniel Valent, Natalia Yeste, Lorenzo E. Hernández-Castellano, Laura Arroyo, Consolación García-Contreras, Marta Vázquez-Gómez, Antonio González-Bulnes, Emøke Bendixen, Anna Bassols. *Journal of Proteomics* 2019 Jul 30;204:103391. doi: 10.1016/j.jprot.2019.103391)

I-FABP, Pig-MAP and TNF- α as biomarkers for monitoring gut-wall integrity in front of *Salmonella* Typhimurium and ETEC K88 infection in a weaned piglet model. Paola López-Colom, Kuai Yu, Emili Barba-Vidal, Yolanda Saco, Susana M^a Martín-Orúe, Lorena Castillejos, David Solà-Oriol, Anna Bassols. *Research in Veterinary Sciences* 2019 May 7;124:426-432. doi: 10.1016/j.rvsc.2019.05.004

Age-related Serum Biochemical Reference Intervals Established for Unweaned Calves and Piglets in the Post-weaning Period. Kuai Yu, Francesca Canalias, David Solà-Oriol, Laura Arroyo, Raquel Pato, Yolanda Saco, Marta Terré, Anna Bassols. *Frontiers in Veterinary Sciences* 2019 Apr 24;6:123. doi: 10.3389/fvets.2019.00123

Housing and road transport modify the brain neurotransmitter systems of pigs: Do pigs raised in different conditions cope differently with unknown environments? Arroyo L, Valent D, Carreras R, Peña R, Sabrià J, Velarde A, Bassols A. *PLoS One*. 2019 Jan 16;14(1):e0210406. doi: 10.1371/journal.pone.0210406.

Skeletal muscle metabolomics and blood biochemistry analysis reveal metabolic changes associated with dietary amino acid supplementation in dairy calves. Kuai Yu, Manolis Matzapetakis, Daniel Valent, Yolanda Saco, André M. De Almeida, Marta Terré and Anna Bassols. *Scientific Reports Sci Rep*. 2018 Sep 14;8(1):13850. doi: 10.1038/s41598-018-32241-4.

Preparation of a canine C-reactive protein serum reference material: feasibility studies. Canalias, Francesca; Piñeiro, Matilde; Pato, Raquel; Peña, Raquel; Bosch, Lluís; Soler, Lourdes; Garcia, Natalia; Lampreave, Fermín; Saco, Yolanda; Bassols, Anna. *Veterinary Clinical Pathology* (2018) 47:122–129.

Daniel Valent, Laura Arroyo, Raquel Peña, Kuai Yu, Ricard Carreras, Eva Mainau, Antonio Velarde, Anna Bassols. Effects on pig immunophysiology, PBMC proteome and brain neurotransmitters caused by group mixing stress and human-animal relationship. *PLOS One* 2017 May 5;12(5):e0176928. doi: 10.1371/journal.pone.0176928

- Biochemical and proteomic analyses of the physiological response induced by individual housing in gilts provide new potential stress markers. A. Marco-Ramell, L. Arroyo, R. Peña, R. Pato, Y. Saco, L. Fraile, E. Bendixen and A. Bassols. *BMC Veterinary Research* (2016) 12:265 doi 10.1186/s12917-016-0887-1
- Effect of handling on neurotransmitter profile in pig brain according to fear related behavior. Laura Arroyo, Ricard Carreras, Daniel Valent, Raquel Peña, Eva Mainau, Antonio Velarde, Josefa Sabrià, Anna Bassols. *Physiology and Behavior* (2016) 167, 374–381
- Proteomics and the search for welfare and stress biomarkers in animal production in the one-1 health context. A. Marco-Ramell, A. M. de Almeida, S. Cristobal, P. Rodrigues, P. Roncada and A. Bassols. *Molecular Biosystems* (2016) **12**, 2024 – 2035. doi: 10.1039/C5MB00788G
- C-reactive protein, haptoglobin and pig-major acute protein profiles induced by different isolates of porcine reproductive and respiratory syndrome virus experimental infection. Y. Saco, F. Martínez-Lobo, M. Cortey, R. Pato, R. Peña, J. Segalés, C. Prieto and A. Bassols. *Veterinary Microbiology* (2016) 183, 9–15